

June 14, 2016



Mr. James M. DiLorenzo
Remedial Project Manager
United States Environmental Protection Agency
Office of Site Remediation and Restoration
5 Post Office Square, Suite 100, Mail Code: OSRR07-4
Boston, Massachusetts 02109-3912

**Subject: GW-413 Area Supplemental Investigation Proposal
Olin Chemical Superfund Site
Wilmington, Massachusetts**

Dear Mr. DiLorenzo:

On behalf of Olin Corporation, please find below, in letter format, a proposal for installation of additional groundwater monitoring wells at suitable locations and scales in the direction that we believe to be downgradient of GW-413. The purpose of this proposed work is to better define the nature and extent of groundwater impacts, principally n-nitrosodimethylamine (NDMA), and to confirm the suspected direction of groundwater flow north of the Olin Property.

1.0 BACKGROUND INFORMATION

In December 2015, in fulfillment of the requirements of the approved OU3 Data Gap Analysis and Additional Field Studies Work Plan (Amec Foster Wheeler, 2015), well cluster location GW-413 was installed on the Lehigh Cement Company Property located north of the Olin property at 51 Eames Street, Wilmington MA. The cluster consists of two vertically paired overburden wells constructed as nested wells within the same flush mounted casing, and a shallow bedrock well in a separate flush mounted casing. The depth to bedrock is approximately 35 feet below ground surface (ft bgs) and the depth to the water table is approximately five feet. The overburden wells monitor the shallow and deeper overburden (GW-413S/D). The shallow well is screened from 6-16 ft bgs and the deeper well from 25-35 ft bgs. The bedrock well was screened with a fifteen foot screen from 41-56 ft bgs to straddle the two most transmissive fractures. The boring and well construction logs for GW-413 are contained in Appendix A. The bedrock borehole was geophysically logged in accordance with the work plan and the geophysical logs are provided in Appendix B.

The wells were developed and sampled in January 2016. Analytical results for NDMA in the shallow overburden well indicated an estimated concentration of 1.8 ng/L. Analytical results for NDMA in the deeper overburden well indicated a concentration of 1,700 ng/L which was confirmed by a resample collected in February 2016. This concentration is greater than concentrations of NDMA observed along the northeastern side of the Olin property. The analytical result for NDMA in the shallow bedrock well was an order of magnitude lower at 130 ng/L. Additional proposed wells will therefore target deep overburden and shallow bedrock groundwater.

Figure 1 depicts this new well location (GW-413S) and the analytical results for NDMA in the shallow overburden for wells on the Olin property. Figure 2 depicts this new well location (GW-413D) and the analytical results for NDMA in the deep overburden groundwater for wells on the Olin property.

Table 1 provides the analytical results for detected analytes at GW-413 S/D/BR and the two closest nearby wells (GW-31 S/D and GW-32 S/D).

Table 2 below provides groundwater elevation data collected at the time of groundwater sampling. Groundwater vertical gradients are upward from shallow bedrock to deep overburden, and from deep overburden to shallow overburden.

Table 2. Groundwater Elevations and Gradients

Well ID	Northing	Easting	PVC TOC Elevation (feet MSL)	Thursday, January 21, 2016		
				Depth to GW (feet)	Elevation MSL	Gradient
GW-413S	557901.52	692855.59	86.18	5.82	80.36	
GW-413D	557901.52	692855.59	86.26	5.71	80.55	up
GW-413BR	557900.55	692862.27	86.53	5.36	81.17	up

PVC = Poly Vinyl Chloride, TOC= Top of casing, GW= groundwater, MSL = Mean Sea Level

2.0 OTHER PUBLISHED SOURCES OF GEOLOGIC AND HYDROGEOLOGIC INFORMATION

Olin conducted a review of other readily available geologic and hydrogeologic information including MassDEP environmental reports at other nearby sites, review of the 1950 USGS topographic map that predated much of the industrial/commercial development in the area, and inspection of the 2005 Preliminary Wilmington Bedrock Geologic Quadrangle Map by R. Castle, C. Hepburn, and J. Kopera¹.

These sources of information were reviewed to refine current understanding of the thickness of saturated overburden, location of bedrock surface exposures, depth to bedrock and the likely direction of overburden groundwater flow. The most relevant reports included:

¹ http://www.geo.umass.edu/stategeologist/Products/Bedrock_Geology/Wilmington/wilm_bedr_v1-0.pdf

- March 21, 2013 Letter Report from GZA on behalf of AllCoat Technology, 100 Eames Street concerning September 2012 Groundwater Monitoring Results under MassDEP Release Tracking Numbers 3-0470 and 3-19519 for a Response Action Outcome (RAO).
- May 2, 2002 Report by Snow and Associates titled Down Gradient Property Status Opinion on behalf of United Tool and Die Company located at 98 Eames Street.
- December 18, 2012 Phase II Comprehensive Site Assessment Addendum, Phase III Remedial Action Plan Addendum, and Response Action Outcome Statement for the DSM NeoResins Facility Located at 780 Main Street, Wilmington MA. RTN-30002549
- December 22, 2009 Letter Report from AECOM on behalf of DSM NeoResins titled Phase IV Status Report, Former Underground Storage Tank (UST) Area.

Other reports were available but did not contain relevant information. These included a 1993 Fluor Daniel GTI RAO report for Textron concerning a limited site investigation for total petroleum hydrocarbons (TPH) and 1,1,1 trichloroethane (1,1,1 TCA) and a 2009 Downgradient Status Report for Koch Industries by Brown and Caldwell.

A brief synopsis of relevant information and observations concerning groundwater flow from these reports follows.

AllCoat Technology and United Tool and Die. The 2013 letter report summarized prior findings and presented an historical 2001 overburden groundwater potentiometric map for both the AllCoat Property (formerly Raffi and Swanson) and United Tool and Die. The AllCoat facility is located north of Eames Street on the immediate east side of Upper East Ditch and the United Tool is located across Eames Street from the Olin property on the west side of East Ditch. The 2002 Downgradient Property Status Opinion letter presents similar but older data for that subject property. The primary contaminants of interest at both properties included 1,1,1 TCA and trichloroethene (TCE), and also toluene at the AllCoat Property.

Both reports indicate overburden groundwater flow is toward Upper East Ditch from both sides. The wells discussed in both reports are screened in both shallow and deep overburden consisting of fill, outwash and till deposits. Where deep and shallow well pairs are present, vertical gradients are upward, consistent with data from GW-413 BR/D/S and discharging shallow groundwater conditions. The groundwater figure from the GZA report is included in Appendix C.

DSM NeoResins. The investigations at NeoResins focused primarily on a very small area approximately 140 feet (E-W) by 160 feet (N-S) related to releases from and in the vicinity of former underground storage tanks near a former truck scale. The location of the site and portion of the facility investigated are presented in figures from the AECOM report contained in Appendix D. Primary constituents of interest were xylenes, ethylbenzene, 1,2,3- and 1,3,5-trimethylbenzene, and n-propyl benzene. The investigations included installation of overburden and shallow bedrock groundwater wells over a slightly broader area to evaluate downgradient

groundwater. This portion of the facility was developed over wetlands shown on the 1950 USGS topographic map, a portion of which is presented as Figure 3.

The investigations concluded that bedrock is relatively shallow in vicinity of the UST area (11 to 25 ft bgs) sloping to the west-southwest. Bedrock was weathered within the top 2-8 feet, and was moderately competent to depths of 10-15 feet based on rock quality designation (RQD) data. Below 15 feet RQDs ranged from 73% to 100% indicating highly competent rock.

The thickness of saturated overburden groundwater ranges from several inches to several feet, primarily within sands and gravels. Overburden groundwater is encountered from 7 to 12 ft bgs and is interpreted to flow toward the west-northwest. Bedrock groundwater flows northwest across the site. Groundwater surface maps and cross sections are also provided in Appendix D. Vertical gradients between overburden and bedrock vary seasonally with upward gradients predominating in the winter and summer when precipitation and net infiltration is lower.

Bedrock Surface Observations

Based on the available geologic maps and observations, bedrock is exposed at the ground surface west of the Olin property at 2 Jewel Drive near Eames Street, along the east side of the Olin parking lot north of Plant B, across from Town Park in the MBTA railroad cut that crosses under Main Street, and along a drainage swale on the DSM NeoResin's property. Where bedrock is exposed at the ground surface overburden pinches out and the continuity of overburden groundwater is disrupted.

3.0 CONCEPTUAL SITE MODEL OF GROUNDWATER FLOW AND GROUNDWATER / SURFACE WATER INTERACTION IN VICINITY OF GW-413 AND UPPER EAST DITCH

Based on the analytical results of shallow versus deep overburden groundwater from the newly installed GW-413 wells, a large contrast exists in concentrations of NDMA and related constituents between shallow and deep overburden as well as bedrock groundwater. Surface water results from OU2 in East Ditch were consistent with shallow groundwater. Shallow groundwater contains low concentrations of NDMA and low concentrations of chlorinated ethane and ethene compounds, consistent with release histories from the nearby AllCoat and United Tool and Die properties. Downstream along Upper East Ditch to the north, overburden groundwater pinches out against bedrock near the MBTA underpass at Main Street. While locally shallow groundwater discharges to East Ditch, the flux of overburden groundwater to surface water is not sufficient to capture deeper groundwater, and it is presumed that deeper overburden groundwater passes under East Ditch to the north. Based on data from DSM NeoResins it is reasonable that bedrock groundwater mimics overburden groundwater with respect to general flow direction.

Based on the wetland area in Figure 3 and the depicted area where a topographic low is present and where a corresponding bedrock low would be expected, it is reasonable that groundwater from GW-413 would flow northerly, eventually turning north westerly in the vicinity of DSM NeoResins. Between GW-413 and NeoResins the thickness of overburden groundwater decreases and bedrock becomes shallower. The deep overburden and shallow bedrock groundwater are connected hydraulically. The strategy for the proposed groundwater investigation therefore includes sampling both deep overburden and shallow bedrock groundwater.

4.0 SUMMARY OF PROPOSED INVESTIGATION LOCATIONS

Based on the current CSM for groundwater conditions, Olin proposes installing up to three wells to better define the lateral and downgradient extent of NDMA in groundwater. Based on the results from GW-413 only NDMA and inorganic compounds are proposed for chemical analysis since other OCSS Site-related SVOCs and VOCs were not detected. Three potential well locations are identified in Figure 4 and are subject to negotiation of an access agreement.

The new wells would be installed using drilling methods consistent with the installation at GW-413 and include a deep overburden well and a shallow bedrock well. The bedrock borehole will be geophysically logged prior to installing the well screen to obtain information on bedrock structure and the orientation of water bearing fractures.

5.0 SCHEDULE

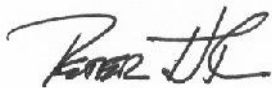
Olin will initiate access agreement negotiations upon approval of this letter work plan by the United States Environmental Protection Agency (USEPA).

Once access is obtained, Amec Foster Wheeler will contact the drilling and geophysical subcontractors to schedule the work. USEPA will be notified of the schedule progress by Olin.

If you have any questions concerning this proposal, please do not hesitate to contact Mr. James Cashwell, Olin Corporation, at 423-336-4012.

Sincerely,

Amec Foster Wheeler Environment & Infrastructure, Inc.



Peter H. Thompson
Project Manager



Michael J. Murphy
Project Principal

cc: Amec Foster Wheeler Project File
J. Cashwell, Olin (1)
Joseph Coyne, MassDEP (1)

Attachments

Tables

Figures

Appendix A Boring and Well Construction Logs

Appendix B Borehole Geophysical Logs

Appendix C GZA Report Figure for AllCoat Technology and United Tool & Die

Appendix D AECOM Report Figures for DSM NeoResins

TABLES AND FIGURES

Table 1
Summary of Detected Analytes
GW-31, GW-32 and GW-413 Well Clusters
GW 413 Area Supplemental Investigation Work Plan
Olin Wilmington, Massachusetts

Media Location Field Sample Date Field Sample ID Qc Code Units	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW						
	GW-413BR	GW-413D	GW-413S	GW-31D	GW-31D	GW-31S	GW-31S	GW-31S	GW-32D	GW-32D	GW-32S	GW-32S					
	1/21/2016	1/21/2016	1/21/2016	5/11/2010	10/12/2010	5/11/2010	10/12/2010	5/11/2010	10/12/2010	10/12/2010	5/11/2010	10/12/2010					
	OC-GW413BR	OC-GW413D	OC-GW413S	OC-GW-31D-XXX	OC-GW-31D-XXX	OC-GW-31S-XXX	OC-GW-31S-XXX	OC-GW-31S-XXX	OC-GW-32D-XXX	OC-GW-32D-XXX	OC-GW-32S-XXX	OC-GW-32S-XXX					
Parameter	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS					
Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier				
NDMA																	
N-Nitrosodimethylamine	ng/l	130		1700	1.8 J	25		12		1.9 U		9.2 J		590	310 J	2 U	43 J
VOCs																	
1,1-Dichloroethane	ug/l	1.7		1.6	1 U	1 U		1 U		1 U		1 U		1 U		1 U	
1,1-Dichloroethene	ug/l	0.66 J		0.52 J	1 U	1 U		1 U		1 U		1 U		1 U		1 U	
1,2-Dichloroethane	ug/l	1 U		0.26 J	1 U	1 U		1 U		1 U		1 U		1 U		1 U	
2,4,4-Trimethyl-1-pentene	ug/l	1 U		1 U	1 U	1 U		4.3		1 U		2.3		2.6		6.8	
2,4,4-Trimethyl-2-pentene	ug/l	1 U		1 U	1 U	1 U		0.76 J		1 U		1 U		1 U		1.4	
Acetone	ug/l	50 U		50 U	3.8 J	50 UJ		50 U		50 UJ		50 U		50 UJ		50 UJ	
Carbon disulfide	ug/l	10 U		10 U	10 U	1.4 J		3.2 J		10 U		0.42 J		10 U		10 U	
Cis-1,2-Dichloroethene	ug/l	1 U		0.98 J	1 U	1 U		1 U		1 U		1 U		1 U		1 U	
Trichloroethene	ug/l	0.5 J		1.8	1 U	1 U		1 U		1 U		1 U		1 U		1 U	
SVOCs																	
2-Nitrophenol	ug/l	4.8 U		4.7 U	0.12 J	4.5 U		4.5 U		4.5 U		4.5 U		4.5 U		4.5 U	
Acenaphthene	ug/l	0.48 U		0.47 U	0.034 J	0.91 U		0.91 U		0.91 U		0.91 U		0.91 U		0.91 U	
Azobenzene	ug/l	0.48 U		0.47 U	0.47 U	4.5 U		4.5 U		4.5 U		4.5 U		1 J		4.5 U	
Benzoic Acid	ug/l	4.8 U		4.7 U	0.74 J	R		4.5 UJ		R		4.5 U		R		4.5 U	
Bis(2-Ethylhexyl)phthalate	ug/l	4.8 U		4.7 U	4.7 U	6.3 U		1.8 U		2.4 U		1.8 U		4.5 U		1.8 U	
Butylbenzylphthalate	ug/l	2.9 U		2.8 U	0.15 J	4.5 U		4.5 U		4.5 U		4.5 U		4.5 U		4.5 U	
Di-n-butylphthalate	ug/l	1.9 U		1.9 U	1.9 U	4.5 U		0.63 J		4.5 U		4.5 U		4.5 U		4.5 U	
Diethylphthalate	ug/l	0.12 J		0.074 J	0.47 U	4.5 U		4.5 U		4.5 U		4.5 U		4.5 U		4.5 U	
Diphenyl ether	ug/l	4.8 U		0.67 J	4.7 U	4.5 U		0.51 J		4.5 U		4.5 U		1.1 J		0.95 J	
Diphenylamine	ug/l	4.8 U		4.7 U	4.7 U	4.7 U						1.2 J		4.5 U		4.5 U	
Diphenylmethanone	ug/l	4.8 U		4.7 U	4.7 U	4.5 U		4.5 U		4.5 U		4.5 U		1.7 J		2.2 J	
N-Nitrosodiphenylamine	ug/l	4.8 U		4.7 U	4.7 U	4.5 U		4.5 U		4.5 U		3.1 J		1.4 J		4.5 U	
Phenanthrene	ug/l	0.06 J		0.19 U	0.078 J	0.18 U		0.18 U		0.18 U		0.18 U		0.18 U		0.18 U	
Inorganics & Wet Chem																	
Ammonia	mg/l	0.2 U		0.16 J	0.17 J												
Bromide	mg/l	0.11 J		0.36	0.075 J	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U		0.14	
Chloride	mg/l	71		330	110	21		25		7.4		31		8.5		18	
Nitrate as N	mg/l	0.05 U		0.063	0.45	0.05 U		0.05 U		0.05 U		0.11		0.05 U		0.05 U	
Nitrite as N	mg/l	0.05 U		0.05 U	0.025 J	0.02 U		0.01 U		0.01 U		0.1 U		0.53		0.01 U	
Nitrogen, as Ammonia	mg/l					2.7		8.6		0.1 U		1.5		11		8	
Sulfate	mg/l	45		160	16	13		17 J		8.9		14		26		25	
Metals																	
Aluminum	ug/l	200 U		200 U	200	460 J		360		200		2100		480		530 J	
Arsenic	ug/l	0.54 J		0.12 J	1.9	15		19		1 U		5 U		1.8		5 U	
Barium	ug/l	38		77	41	16		27		7.5 J		52		8.1 J		13 J	
Beryllium	ug/l	1 U		1 U	1 U	1 U		1 U		0.37 J		0.32 J		1 U		1 U	
Cadmium	ug/l	1 U		1 U	1 U	1 U		1 U		1 U		1 U		1 U		1 U	
Calcium	ug/l	49000		140000	39000	5700		6600		2500		5300		2000		1800	
Chromium	ug/l	5 U		5 U	5 U	5 U		5 U		5 U		5 U		5 U		5 U	
Chromium, Hexavalent	ug/l	0.3 U		0.3 U	0.34 U							1 U		1 U		0.77 J	
Cobalt	ug/l	4 U		4 U	4 U	10 U		10 U		10 U		10 U		2 J		1.8 J	
Copper	ug/l	10 U		10 U	3.8 J	10 U		14 U		10 U		10 U		30		42 U	
Iron	ug/l	31 J		67	170	15000		11000		100 U		7300		3400		2600	
Lead	ug/l	5 U		5 U	5 U	5 U		1.5 J		5 U		5 U		5 U		5 U	
Magnesium	ug/l	9800		28000	2300	700		1300		240 J		830		370 J		440 J	
Manganese	ug/l	18		54	140	350		590		4.9 J		200		230		200	
Mercury	ug/l	0.2 U		0.2 U	0.2 U	0.2 U		0.44		0.2 U		0.21 U		0.2 U		0.2 U	
Nickel	ug/l	10 U		10 U	10 U	10 U		10 U		10 U		10 U		2.4 J		2.9 J	
Potassium	ug/l	5100		4400	5300	820 J		4000 U		4000 U		4000 UJ		1000 J		4000 UJ	
Sodium	ug/l	17000		92000	81000	19000 J		18000		5500		20000 J		42000		55000 J	
Vanadium	ug/l	1.8 J		10 U	1.5 J	11 J		9.7 J		10 U		10 U		3.2 J		4.2 J	
Zinc	ug/l	50 U		50 U	2.2 J	1100		380		13 J		53 J		50 U		50 U	
Specialty Compounds																	
4-Nonylphenol (Tech.)	ug/l	5.9 U		5.6 U	5.6 U									9.1		6.1	

Notes:

FS = Field Sample
ug/L = Micrograms per liter
mg/L = Milligrams per liter
S= Shallow Overburden Well

D=Deep Overburden Well
BR= Shallow Bedrock Well

U = Not detected, value is the
detection limit
J = Value is estimated
R = Data rejected

B = Constituent was detected in
the associated blank

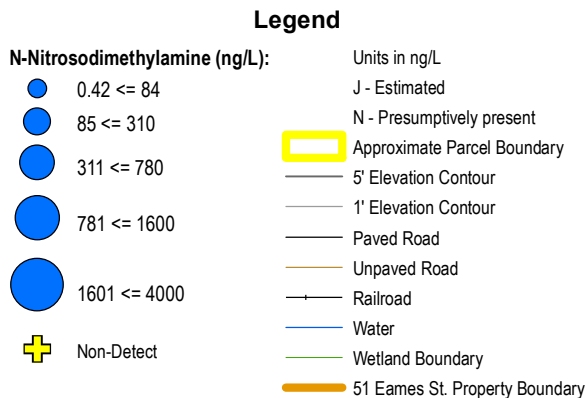
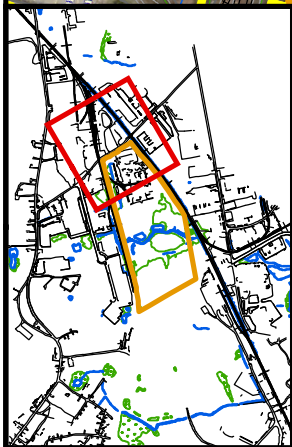
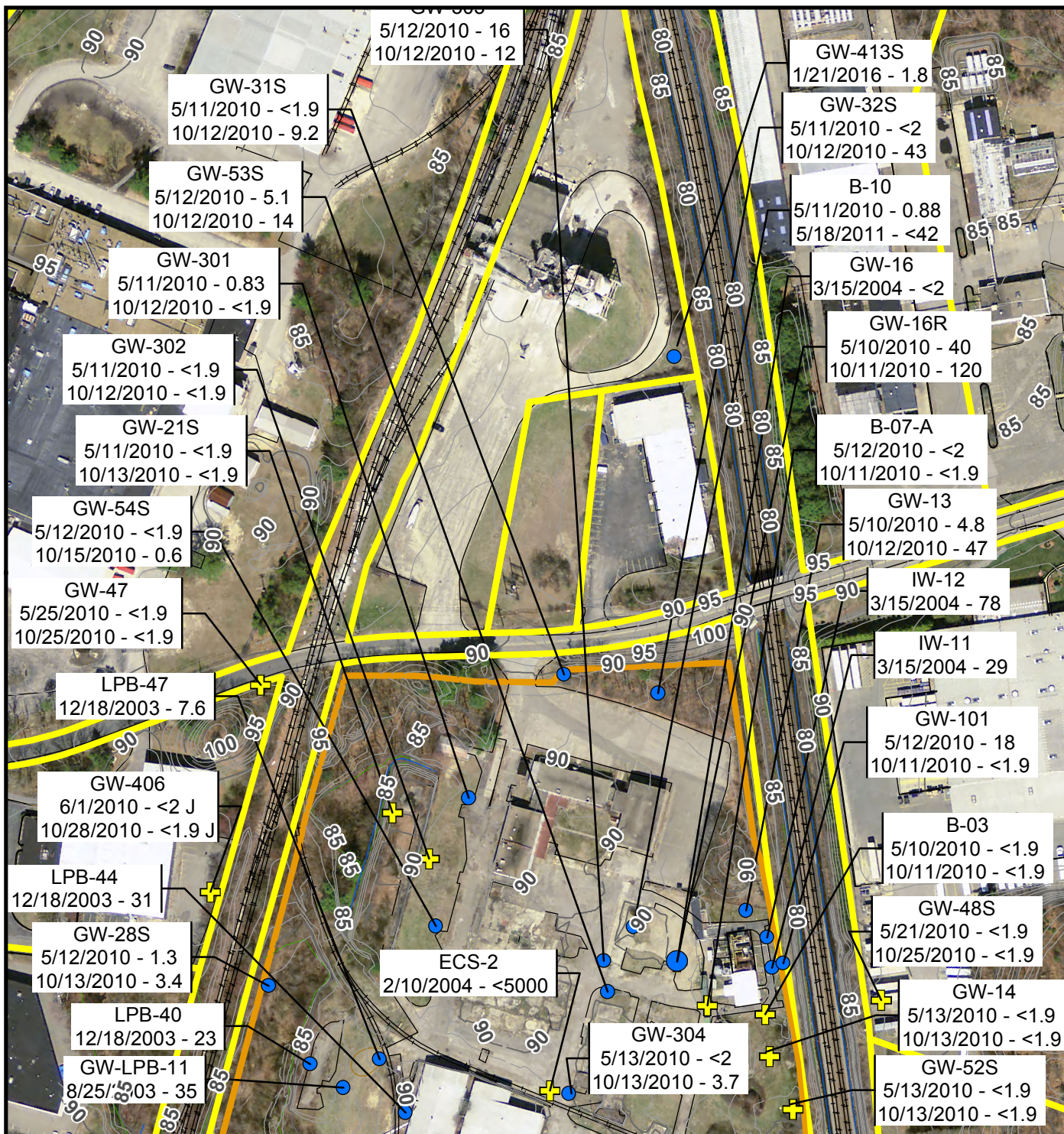
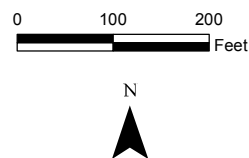
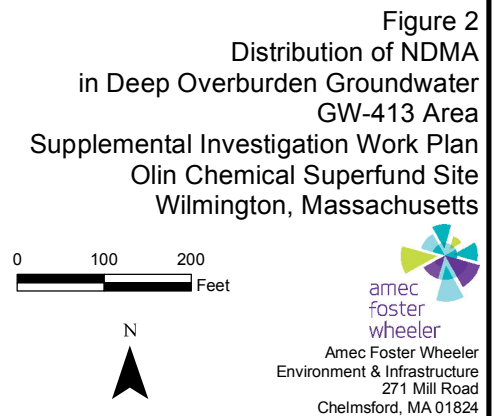
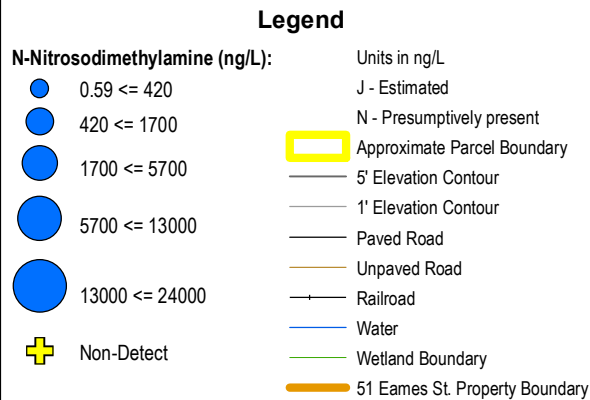
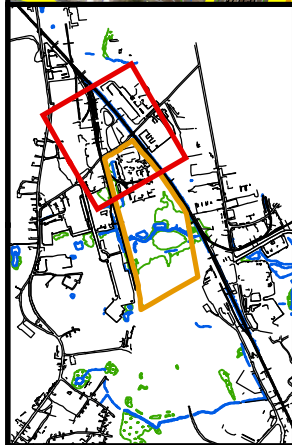
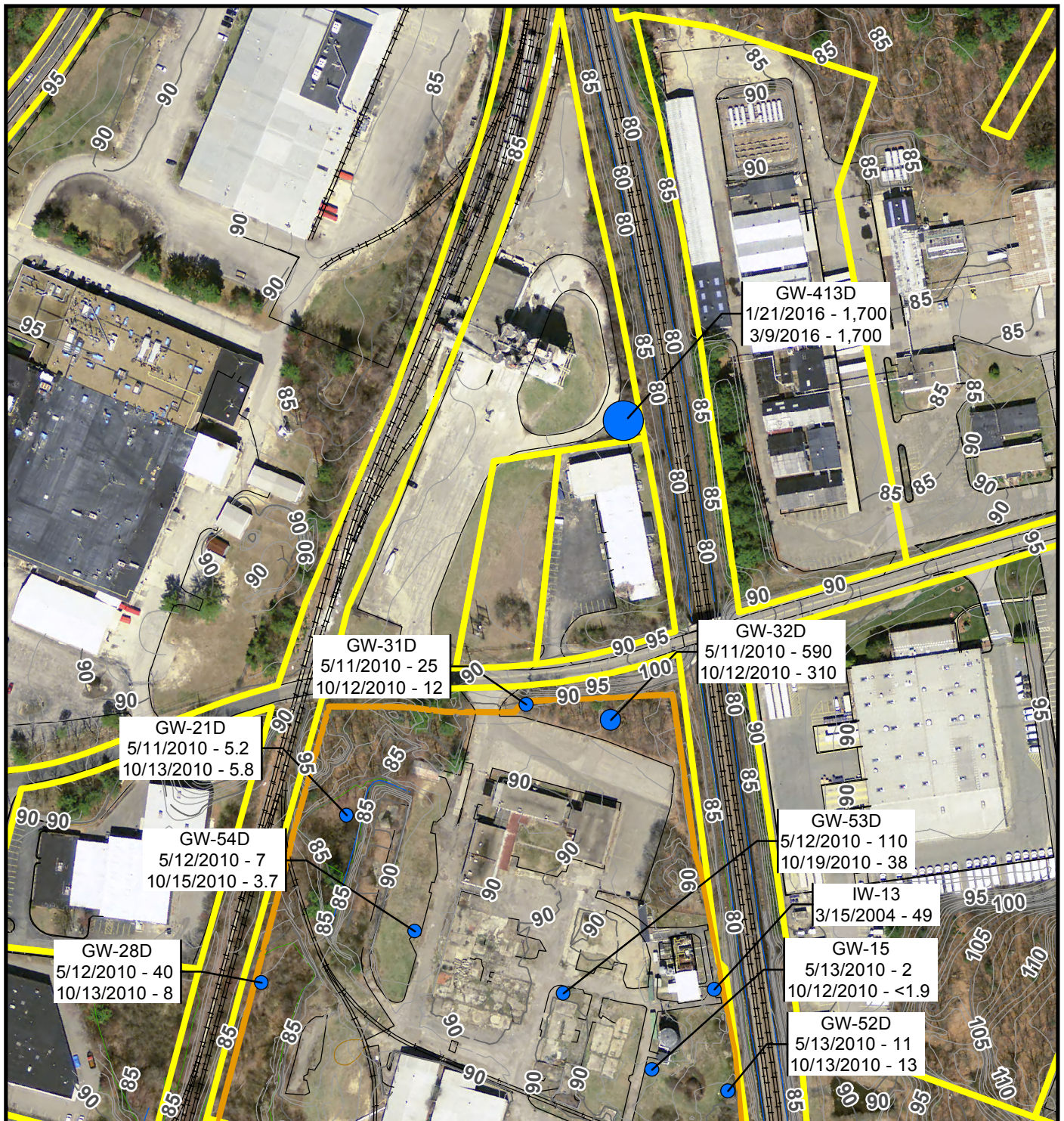
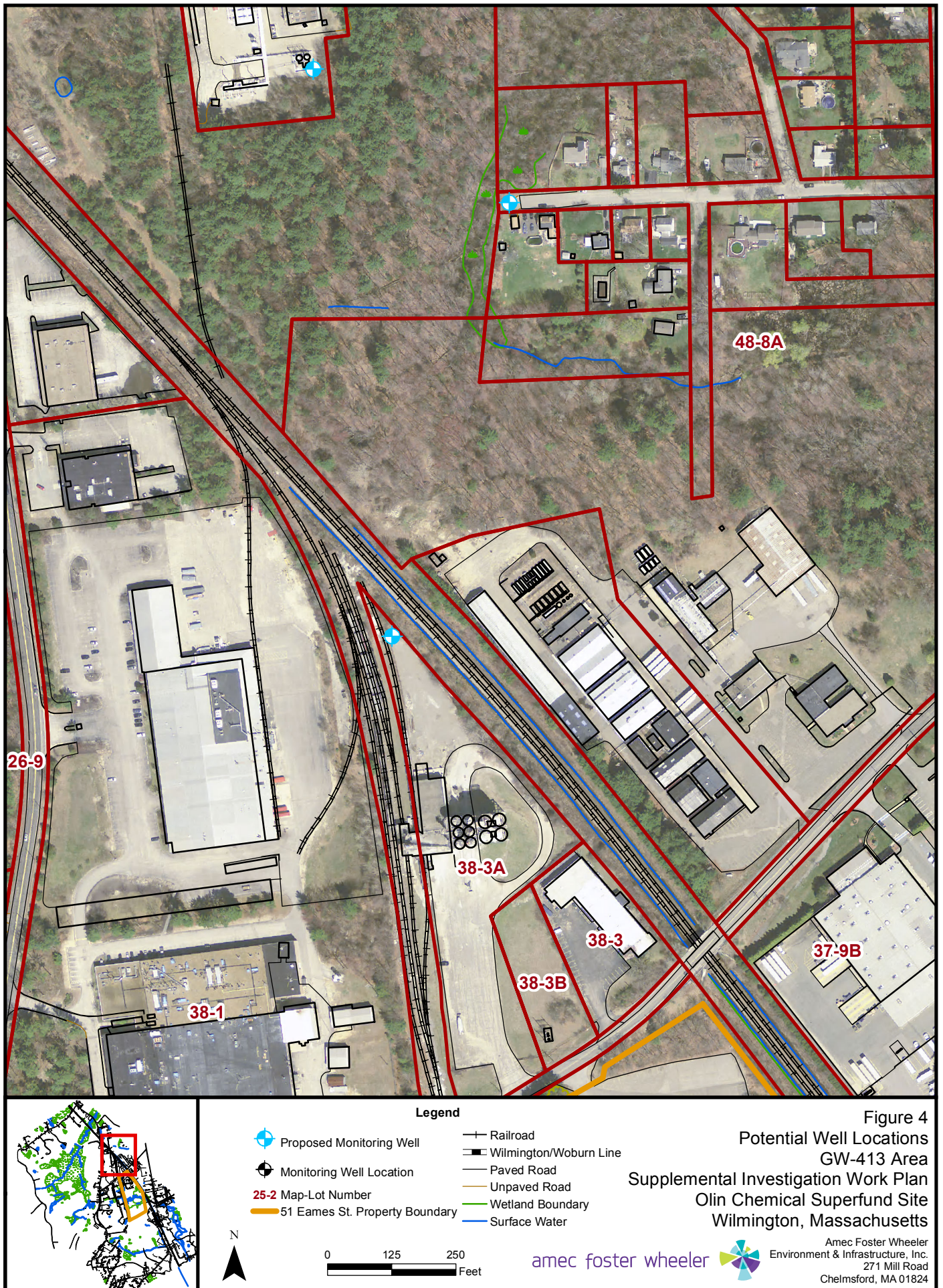


Figure 1
Distribution of NDMA
in Shallow Overburden Groundwater
GW-413 Area
Supplemental Investigation Work Plan
Olin Chemical Superfund Site
Wilmington, Massachusetts










APPENDIX A

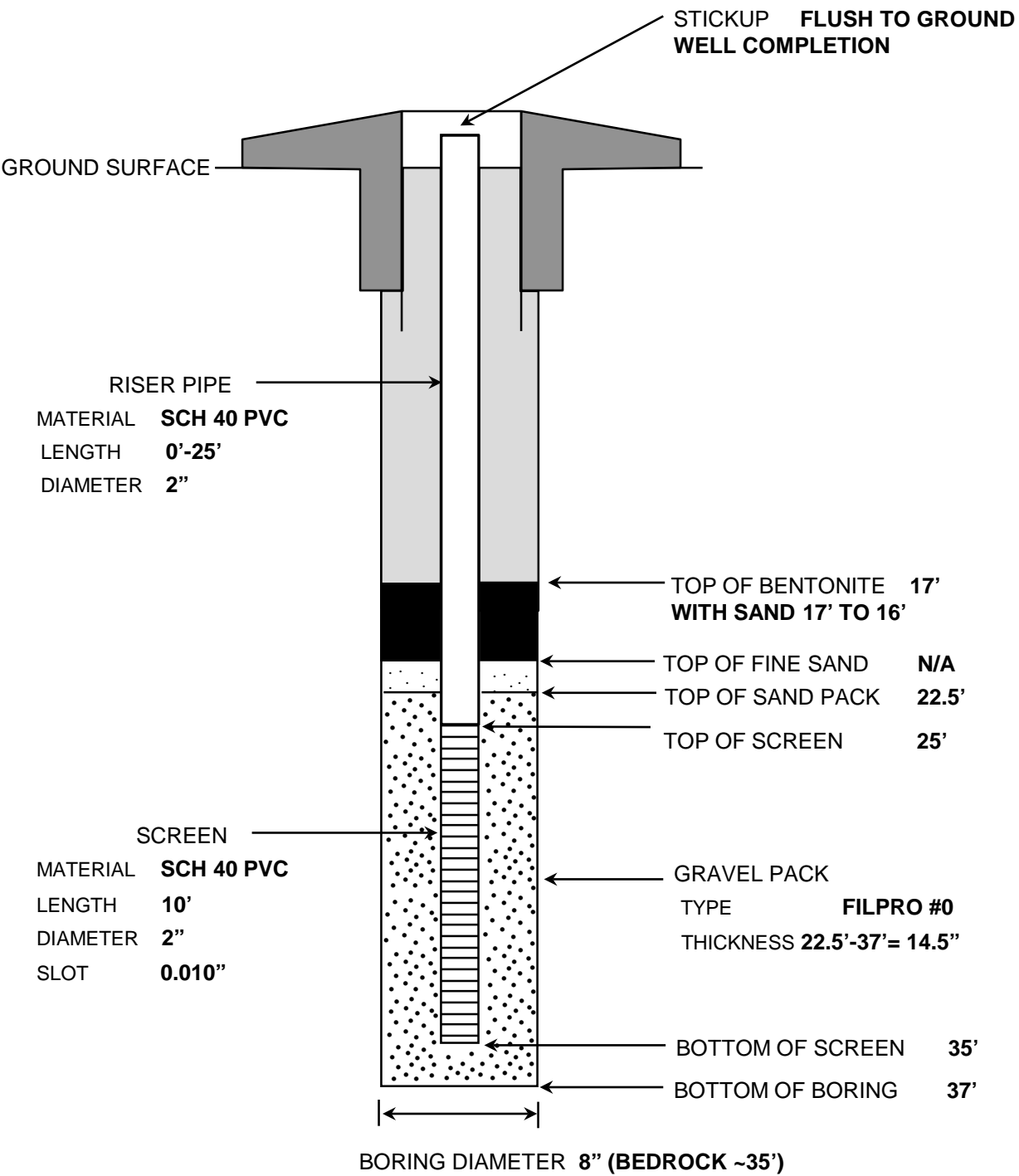
<div>amec foster wheeler</div> <div></div> <div>Soil Boring Log</div> <div>Amec Foster Wheeler Environment and Infrastructure, Inc. 271 Mill Road Chelmsford, MA 01824</div>		Boring ID: GW-413S/413D			Page 1 of 1	
		Project Name: OLIN		Location:		
		Date Started: 2/14/2015		Drilling Company: CASCADE		
		Date Completed: 2/14/2015		Drilling Method: MINI SONIC		
		Total Depth: 37'		Depth to Water: ~12'		
		Geologist: PHT		Comments:		
Depth (feet)	Soil Description	Recovery/ Penetration (feet)	Headspace (ppmv)	Blows/ 6 inches	Sample ID	
0' - 5'	appears to be all FILL brown, med-fine SAND with GRAVEL/COBBLES; contains some coal ash	5'/5'	NM	N/A		
5' - 10'	as above to about 7', then wet at ~8'; over light brown to tan, fine-to-medium SAND still appears as FILL	3'/5'	NM	N/A		
10' 15'	0'-3'; brown f-m SAND, trace cobbles and gravel; wet 3'-4'; dark brown m-c SAND, with FILL 4'-5'; brown to orange fine SAND	5'/5'	NM	N/A		
15' 20'	0'-2'; brown f-m SAND, trace gravel 2'-5'; brown to tan fine SAND & SILT, dense	1'/5'	NM	N/A		
20' -25'	0' 2'; brown to tan, f-c SAND, trace gravel, wet 2' -5'; brown to tan f SAND and SILT, tight, with gravel and cobbles	5'/5'	NM	N/A		
25' - 35'	dark olive green, very fine to fine SAND, dense, with 1" to 3"-sized rock fragments, trace silt, non-cohesive; BASAL TILL. Top of rock 35 ft bgs. Drill to 37' to confirm it is not a boulder.	NM				

WELL CONSTRUCTION DIAGRAM

PROJECT NAME: OLIN DATE INSTALLED: 2/14/2015 WELL NUMBER: GW-413D

PROJECT NUMBER: 6107160016 DRILLING COMPANY: CASCADE METHOD: SONIC

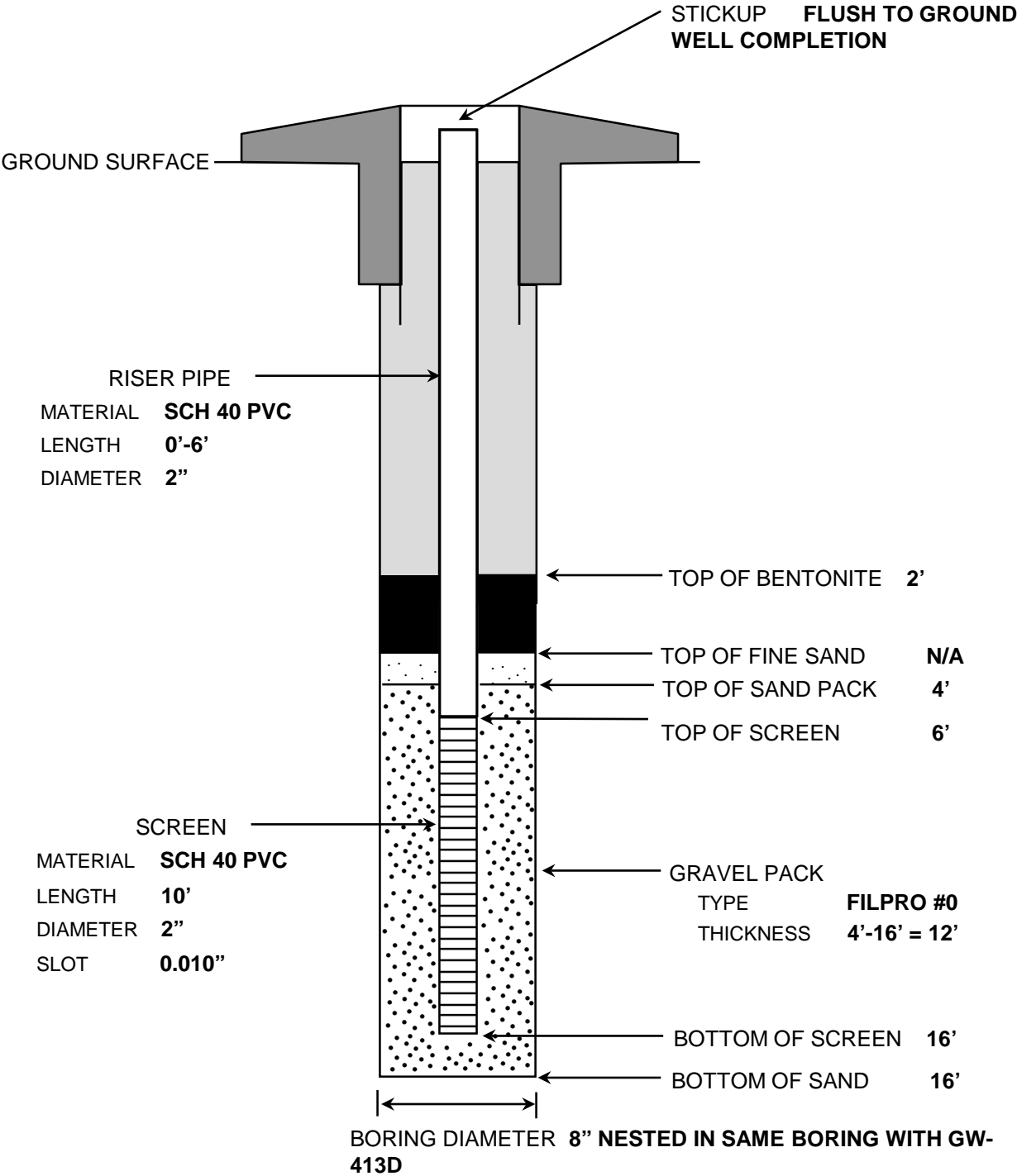
REMARKS: COUPLET WELL WITH GW-413S INSPECTOR: PHT/CM




NOTE: ALL DEPTHS ARE REFERENCED TO GROUND SURFACE

WELL CONSTRUCTION DIAGRAM

PROJECT NAME: **OLIN** DATE INSTALLED: **2/14/2015** WELL NUMBER: **GW-413S**
PROJECT NUMBER: **6107160016** DRILLING COMPANY: **CASCADE** METHOD: **SONIC**
REMARKS: **COUPLET WELL WITH GW-413D** INSPECTOR: **PHT/CM**



NOTE: ALL DEPTHS ARE REFERENCED TO GROUND SURFACE

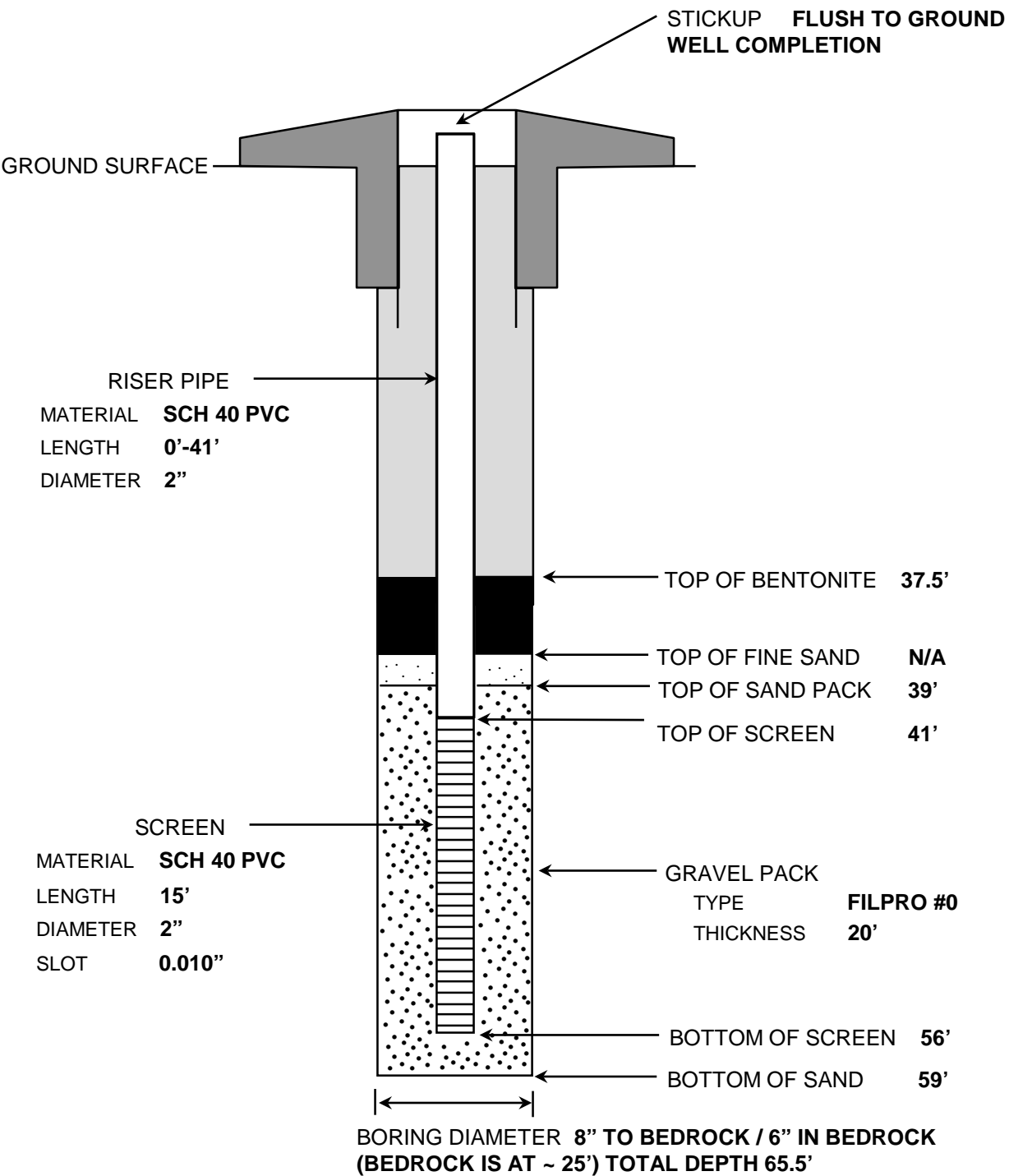
<div>amec foster wheeler</div> <div></div> <div>Soil/Bedrock Boring Log</div> <div>Amec Foster Wheeler Environment and Infrastructure, Inc. 271 Mill Road Chelmsford, MA 01824</div>		Boring ID: GW-413BR			Page 1 of 1	
		Project Name: OLIN		Location:		
		Date Started: 2/14/2015		Drilling Company: CASCADE		
		Date Completed: 2/17/2015		Drilling Method: MINI SONIC		
		Total Depth: 65.5'		Depth to Water: ~12'		
		Geologist: PHT		Comments:		
Depth (feet)	Soil/Rock Description	Recovery/ Penetration (feet)	Headspace (ppmv)	Blows/ 6 inches	Sample ID	
20' - 25'	no sampling to 20', see overburden logs brown to tan, f-c SAND, little silt, angular gravel and rock fragments, dense, poorly sorted; appears as TILL; very cohesive, stiff	NM	NM	N/A		
25' - 35'	dark olive green, very fine to fine SAND, dense, with 1" to 3"-sized rock fragments, trace silt, non-cohesive; BASAL TILL	NM	NM	N/A		
35' - 40'	Coring or bedrock begins at 35' R-1 foliation 45° to core axis; large fracture at 35' with Fe-oxidation; rock is a dark gray MYLONITE with frequent white quartz veining/layering; evidence of past brecciation. At 37' foliation becomes vertical, gneissic banding and vertical fracturing.	2.5'/5'	NM	N/A		
40'-45'	R-2 dark gray-green META-DIORITE composed of plagioclase feldspar, hornblende, biotite with alterations to chlorite; 40-41'; broken and vertically fractured 42.5'-44'; massive and unbroken, tr. pyrite RQD > 50%	3'/5'	NM	N/A		
45' - 50'	R-3 dark gray, massive mafic MYLONITE; vertical fractures infilled with calcite; high angle fractures at 46' and 47' and iron oxides, slickensides - possible water-bearing/transmissive zone; massive again below 48' with mechanical breaks	3'/5'	NM	N/A		
50' - 55'	R-4 dark gray-greenish black, foliated mylonitic META-DIORITE; abundant chlorite; vertical foliations; ; 54' TO 55' is very broken and rusty	NM	NM	N/A		
55' - 65'	R-5 brecciated dark green mylonite/ QUARTZITE; steeply foliated (~70°); lenticular boudinage structures, several steep fracture faces re-healed and broken by drilling action; epidote and chlorite mineralization alteration along some joint fractures. T.D. at 65.5'	6'/10'	NM	N/A		

WELL CONSTRUCTION DIAGRAM

PROJECT NAME: OLIN DATE INSTALLED: 12/17/2015 WELL NUMBER: GW-413BR

PROJECT NUMBER: 6107160016 DRILLING COMPANY: CASCADE METHOD: SONIC

REMARKS: TOTAL DEPTH OF 65.5'; BACKFILLED TO 59' TO SET WELL INSPECTOR: PHT



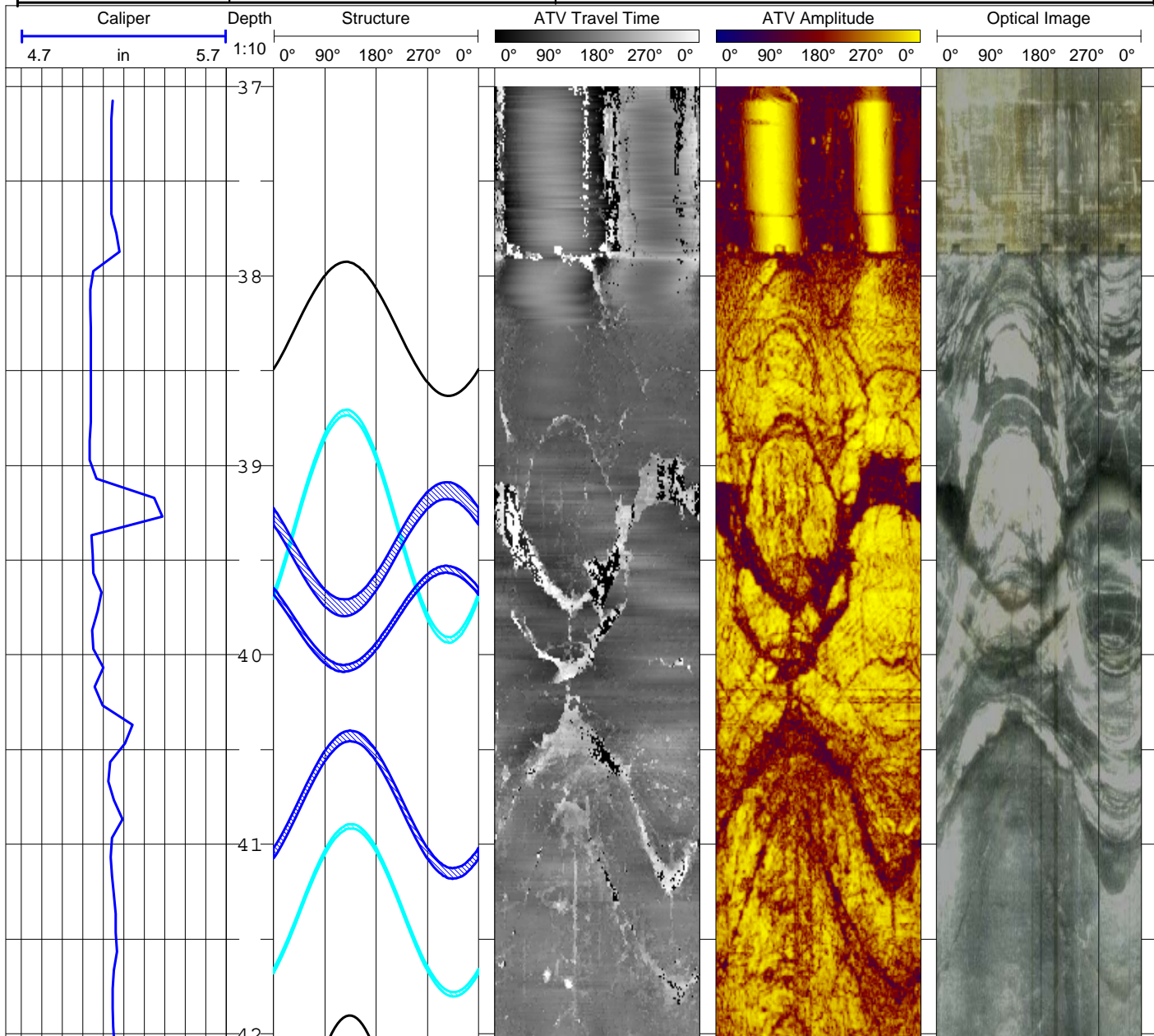
NOTE: ALL DEPTHS ARE REFERENCED TO GROUND SURFACE

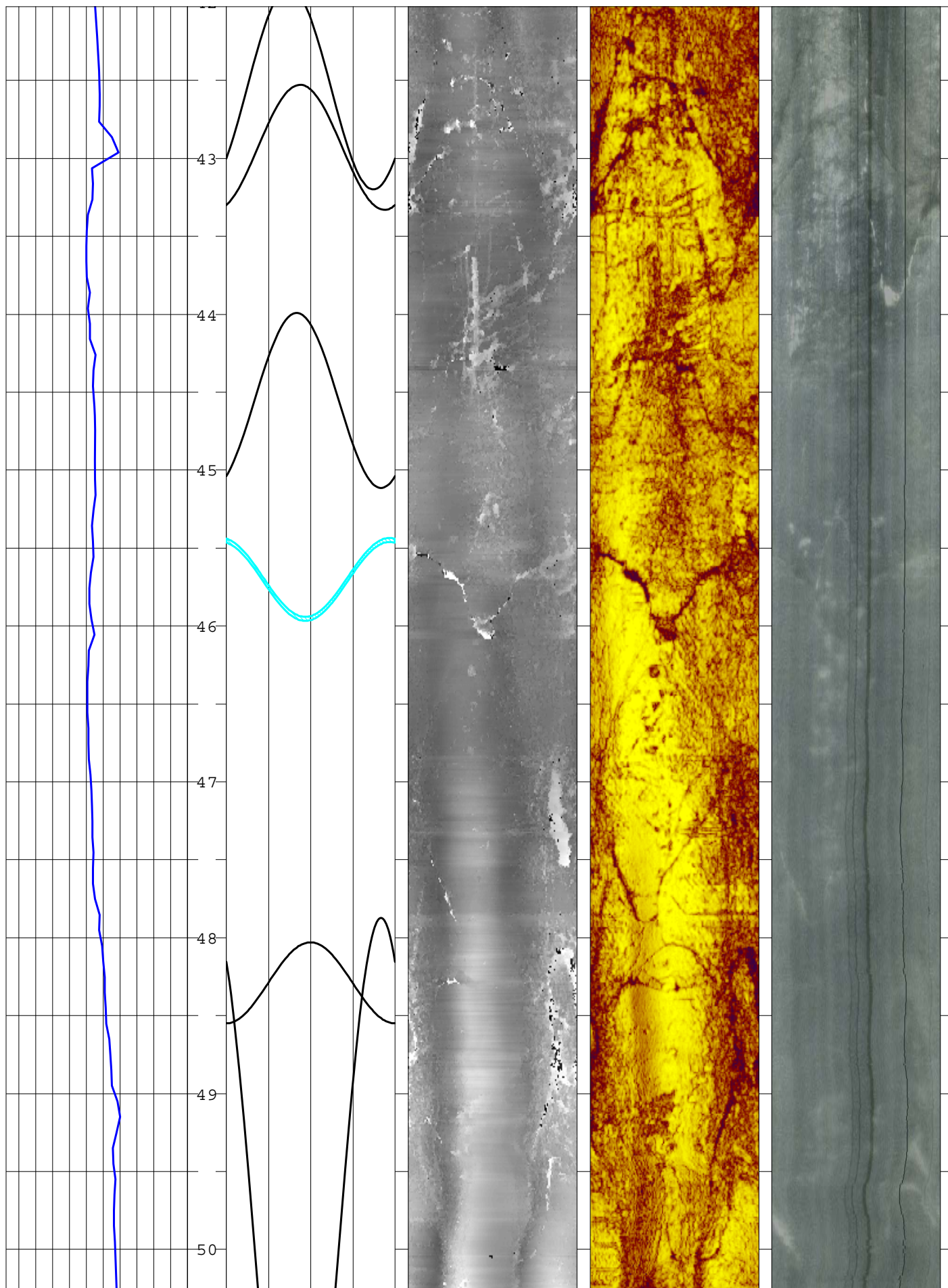
APPENDIX B

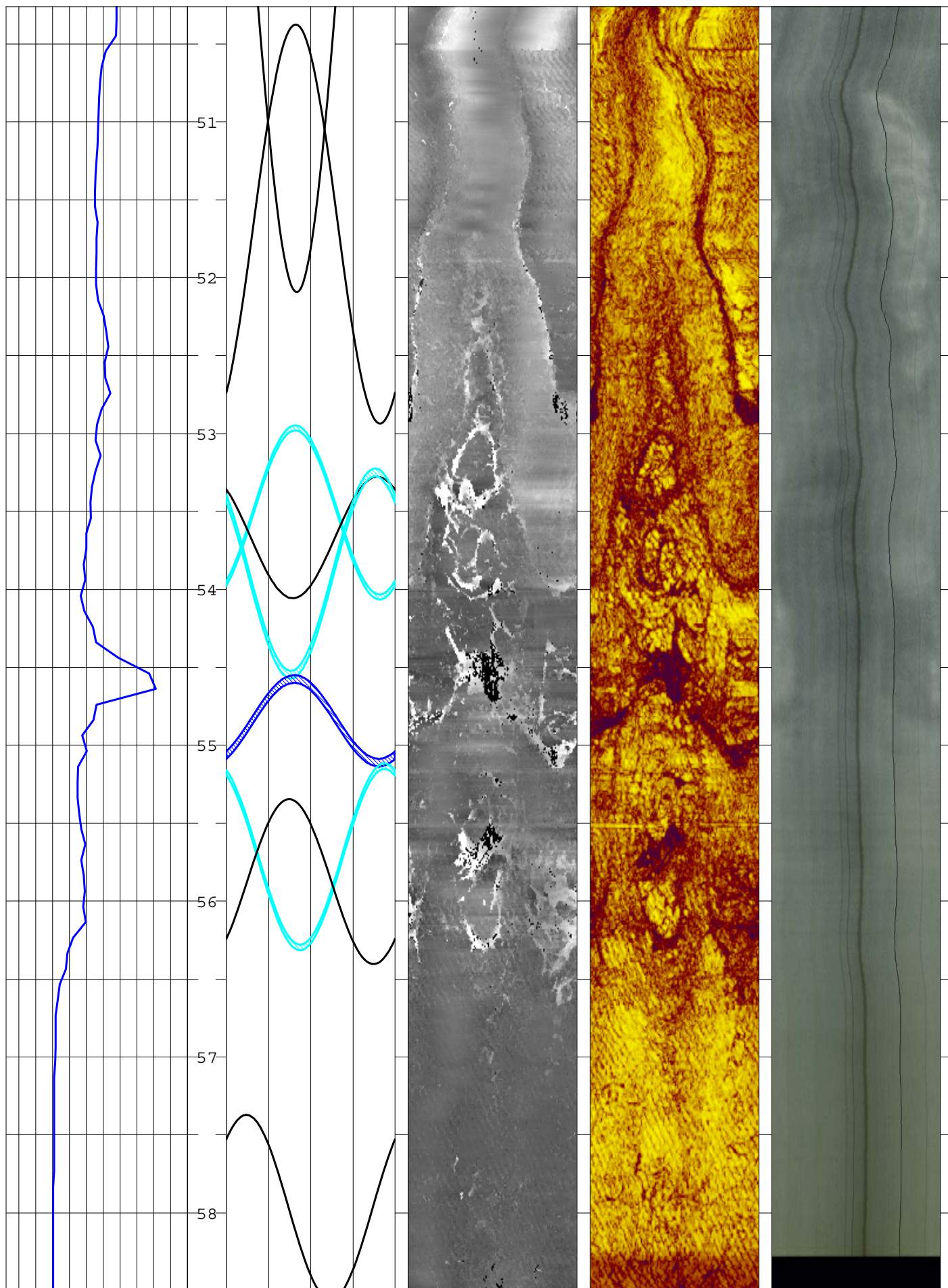


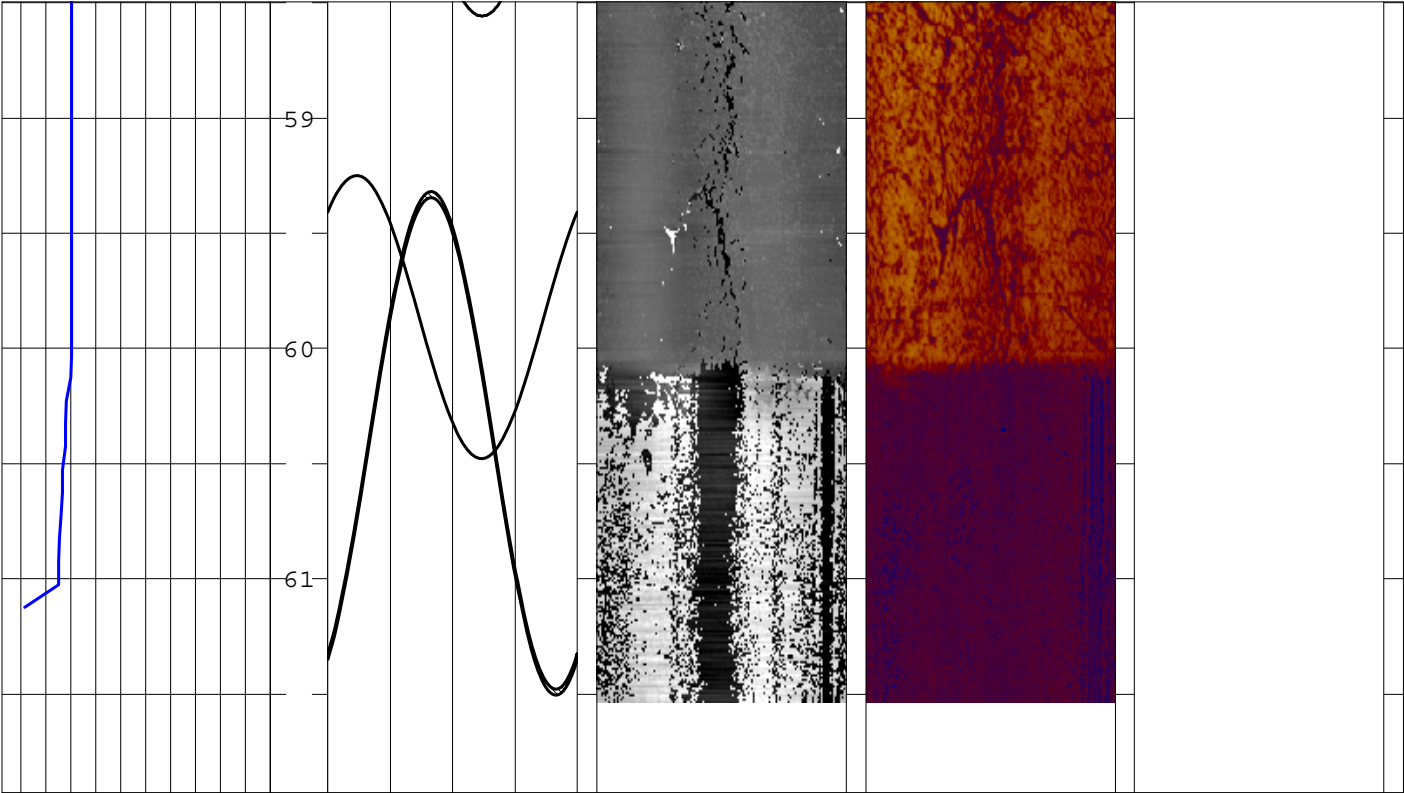
The dip direction is indicated by the line extending from the circle. The strike of the feature is 90 degrees from this.

Northeast Geophysical Services 4 Union Street Bangor, Maine 04401 Tel. 207-942-2700 email: ngsinc@negeophysical.com		Log: DRAFT TELEVIEWER LOGS	
		Well: GW-413	
		Site: Olin Site	
Date:	12/16/2015	Location: Wilmington, MA	
Casing Depth:	37. ft	For: AMEC Foster Wheeler	
Casing Type:	steel	Logged by: R. Rawcliffe	
Boring Depth:	62.1 ft	Orientation: magnetic	
Meas. From:	top of casing	Structure Plots: black = planar features (faults, foliation, bedding, joints, etc) light blue = possibly transmissive fracture dark blue = likely transmissive fracture	
Stickup:	0.4 ft		
Water Level:	12.40 ft		

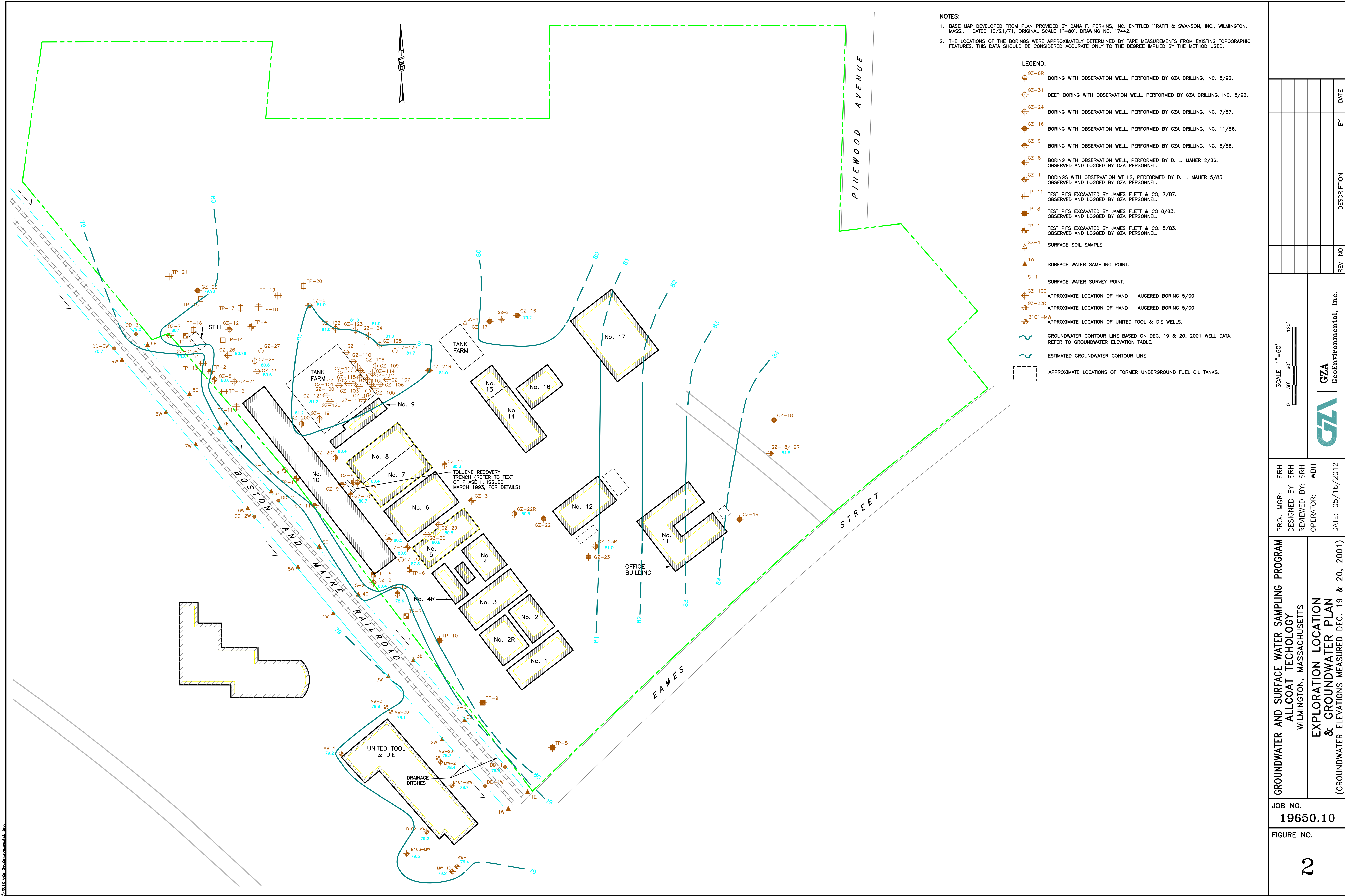








APPENDIX C



NOTES:

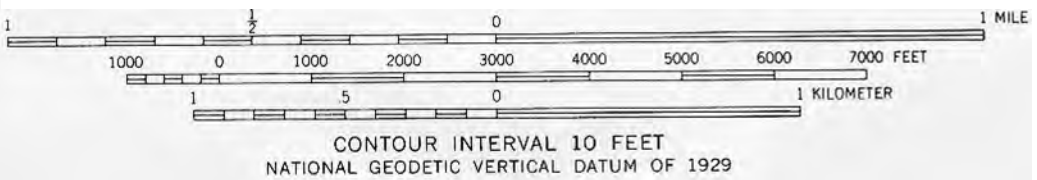
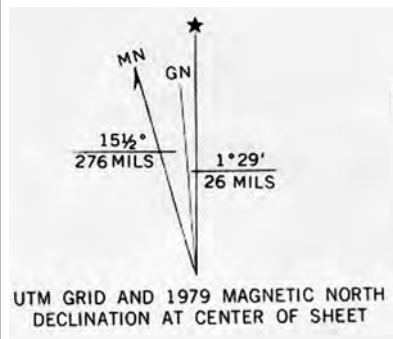
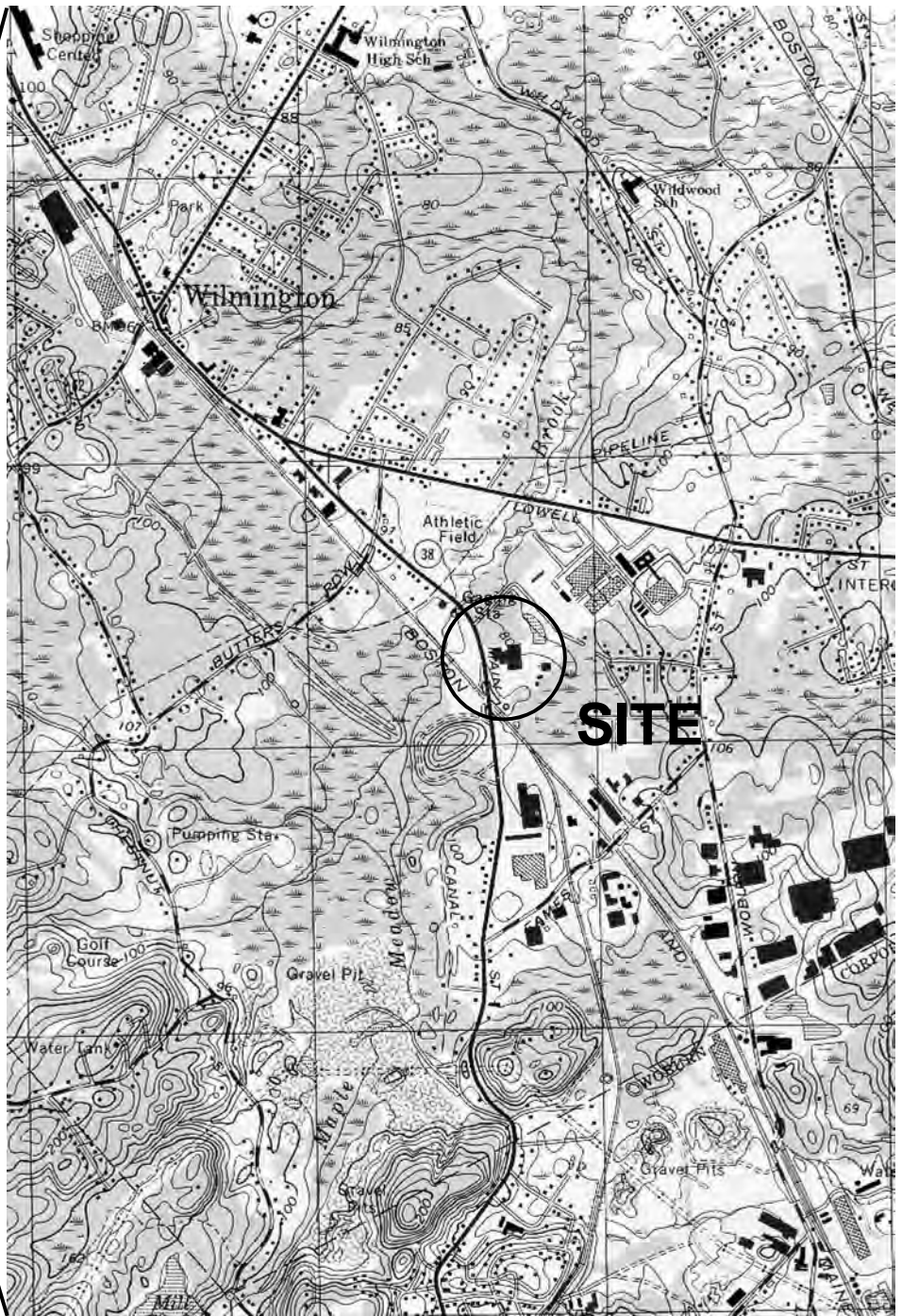
1. BASE MAP DEVELOPED FROM PLAN PROVIDED BY DANA F. PERKINS, INC., ENTITLED "RAFFI & SWANSON, INC., WILMINGTON, MASS., " DATED 10/21/71, ORIGINAL SCALE 1"=80', DRAWING NO. 17442.

2. THE LOCATIONS OF THE BORINGS WERE APPROXIMATELY DETERMINED BY TAPE MEASUREMENTS FROM EXISTING TOPOGRAPHIC FEATURES. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

- LEGEND:
- GZ-8R BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 5/92.
 - GZ-31 DEEP BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 5/92.
 - GZ-24 BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 7/87.
 - GZ-16 BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 11/86.
 - GZ-9 BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 6/86.
 - GZ-8 BORING WITH OBSERVATION WELL, PERFORMED BY D. L. MAHER 2/86. OBSERVED AND LOGGED BY GZA PERSONNEL.
 - GZ-1 BORINGS WITH OBSERVATION WELLS, PERFORMED BY D. L. MAHER 5/83. OBSERVED AND LOGGED BY GZA PERSONNEL.
 - TP-11 TEST PITS EXCAVATED BY JAMES FLETT & CO, 7/87. OBSERVED AND LOGGED BY GZA PERSONNEL.
 - TP-8 TEST PITS EXCAVATED BY JAMES FLETT & CO 8/83. OBSERVED AND LOGGED BY GZA PERSONNEL.
 - TP-1 TEST PITS EXCAVATED BY JAMES FLETT & CO. 5/83. OBSERVED AND LOGGED BY GZA PERSONNEL.
 - SS-1 SURFACE SOIL SAMPLE
 - 1W SURFACE WATER SAMPLING POINT.
 - S-1 SURFACE WATER SURVEY POINT.
 - GZ-100 APPROXIMATE LOCATION OF HAND - AUGERED BORING 5/00.
 - GZ-22R APPROXIMATE LOCATION OF HAND - AUGERED BORING 5/00.
 - B101-MW APPROXIMATE LOCATION OF UNITED TOOL & DIE WELLS.
 - GROUNDWATER CONTOUR LINE BASED ON DEC. 19 & 20, 2001 WELL DATA. REFER TO GROUNDWATER ELEVATION TABLE.
 - ESTIMATED GROUNDWATER CONTOUR LINE
 - APPROXIMATE LOCATIONS OF FORMER UNDERGROUND FUEL OIL TANKS.

JOB NO. 19650.10		FIGURE NO. 2	
GROUNDWATER AND SURFACE WATER SAMPLING PROGRAM ALLCOAT TECHNOLOGY WILMINGTON, MASSACHUSETTS		EXPLORATION LOCATION & GROUNDWATER PLAN (GROUNDWATER ELEVATIONS MEASURED DEC. 19 & 20, 2001)	
PROJ. MGR: SRH	DESIGNED BY: SRH	REVIEWED BY: SRH	OPERATOR: WBH
DATE: 05/16/2012		DATE: 05/16/2012	
SCALE: 1"=60'		GZA GeoEnvironmental, Inc.	
0 30' 60' 120'		REV. NO.	
		DESCRIPTION	
		BY	
		DATE	


APPENDIX D





DSM NeoResins+ FACILITY WILMINGTON, MASSACHUSETTS 60214160-400		SITE LOCATION PLAN	
DATE: 08/10/11	DRWN: RCW/CFD	FIGURE 1-1	


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LEGEND


 BEDROCK MONITORING WELL


 OVERBURDEN MONITORING WELL

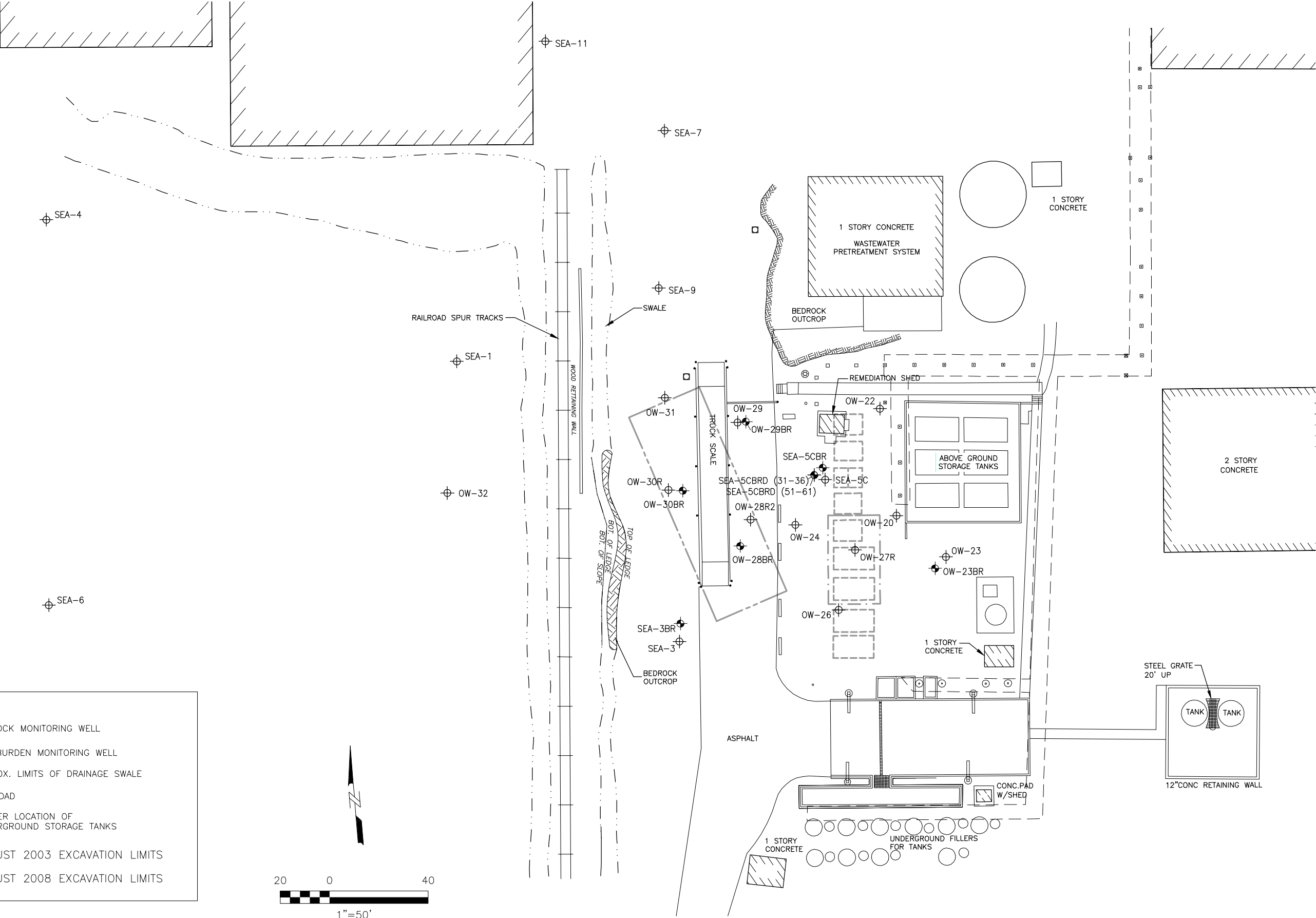
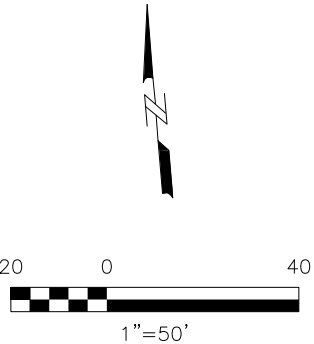
 APPROX. LIMITS OF DRAINAGE SWALE

 RAILROAD

 FORMER LOCATION OF UNDERGROUND STORAGE TANKS

 AUGUST 2003 EXCAVATION LIMITS

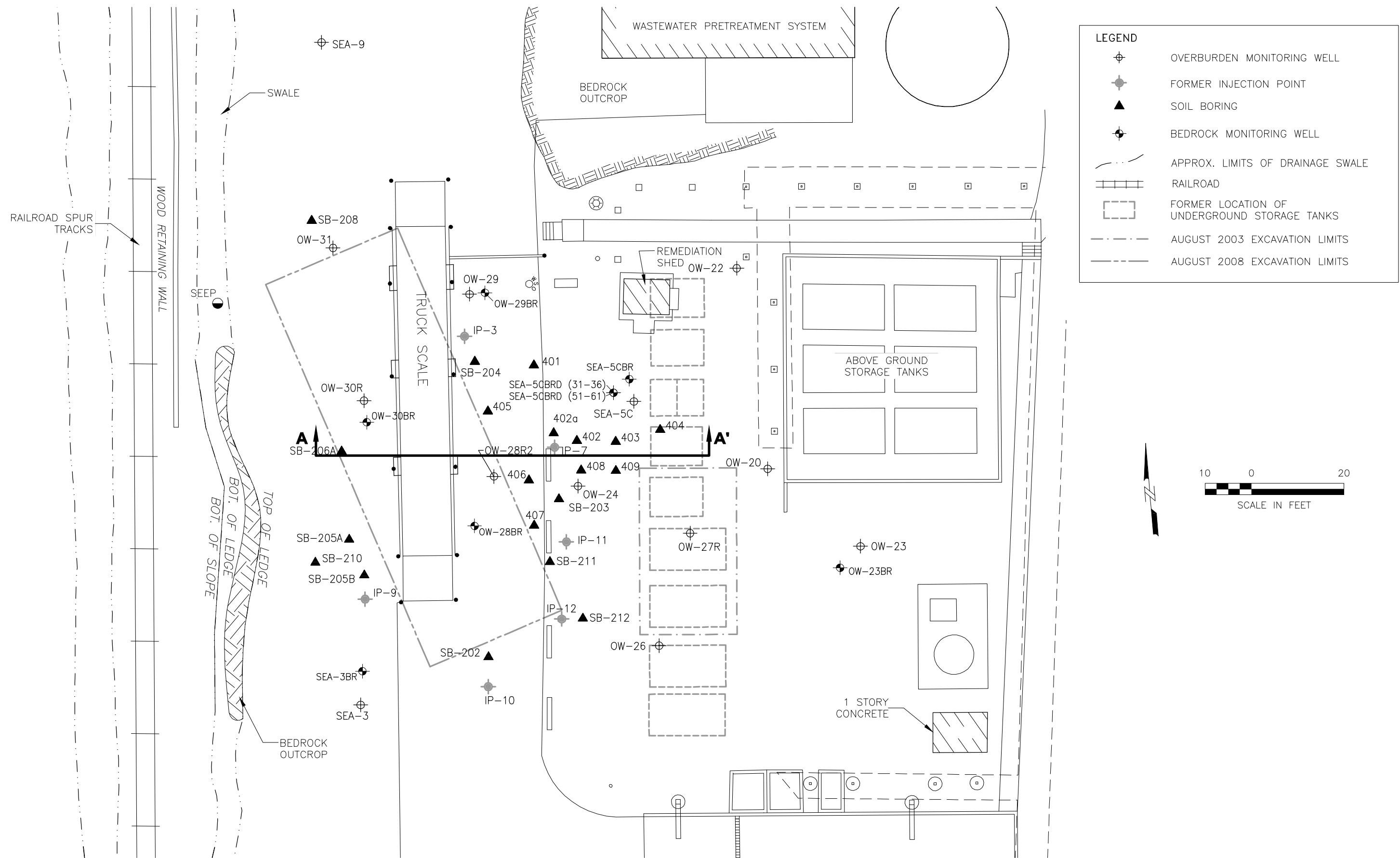
 AUGUST 2008 EXCAVATION LIMITS



DSM NeoResins+ FACILITY WILMINGTON, MASSACHUSETTS 60214160-400			SITE LAYOUT	
DATE: 12/11/12	DRWN: RCW		FIGURE 1-2	



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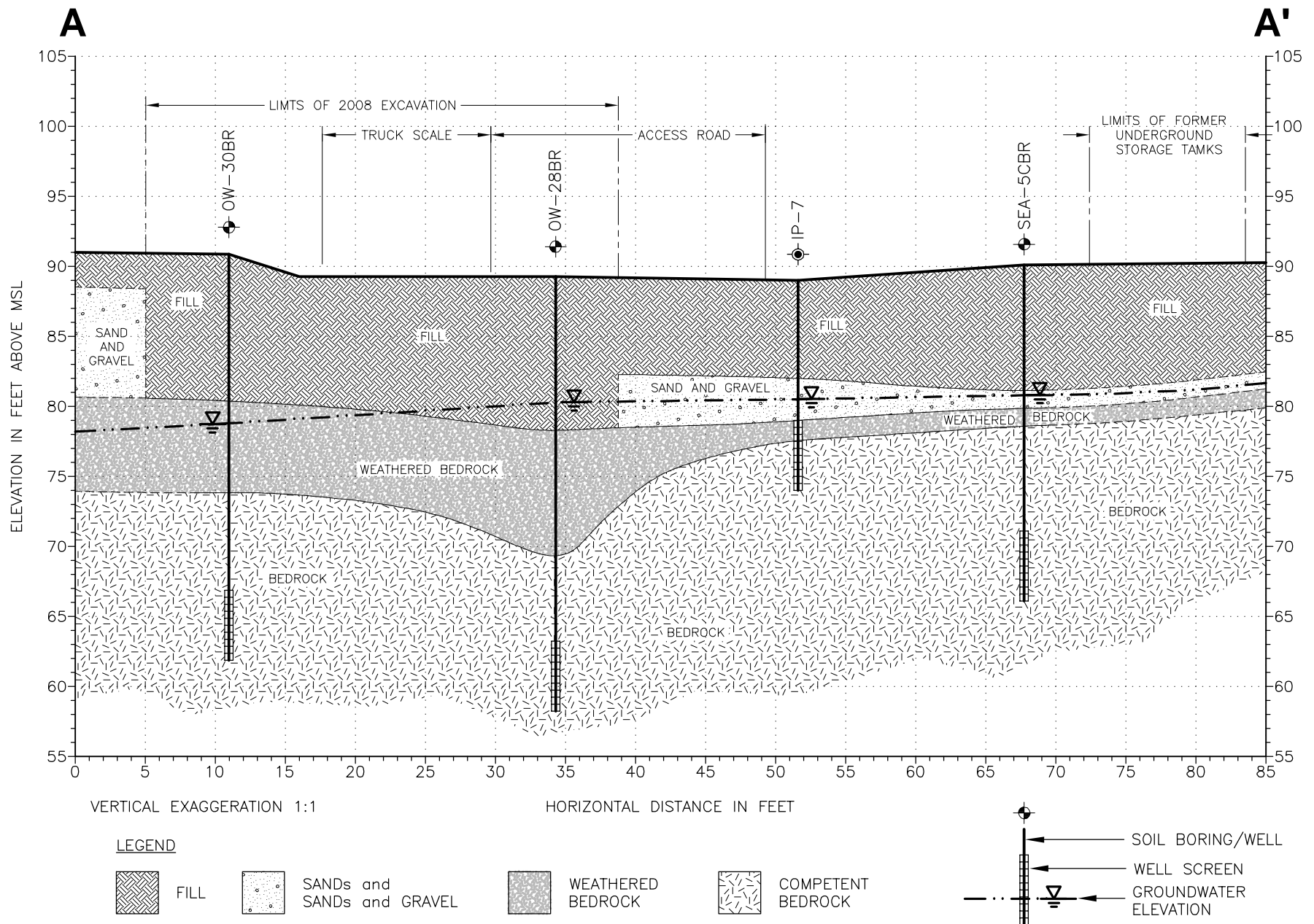
DSM NeoResins+ FACILITY
WILMINGTON, MASSACHUSETTS
60214160-400

DATE: 11/29/12

DRWN: RCW/CFD

SITE LAYOUT, INVESTIGATION LOCATIONS,
AND CROSS SECTION LOCATION

FIGURE 5-1



AECOM

DSM NeoResins+ FACILITY
WILMINGTON, MASSACHUSETTS

60214160-400

DATE: 12/11/12


DRWN: RCW

CROSS SECTION A-A'

FIGURE 5-2

File: F:\PROJECTS\BeaTrice\NeoResins\60214160-P1-AN-01.dwg Layout: OB-GW-04-12 User: warren Plotted: Dec 11, 2012 - 2:22pm Xref's:


LEGEND



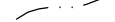
OVERBURDEN MONITORING WELL

80.91

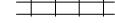
GROUNDWATER ELEVATION (FT. NAVD88)




GROUNDWATER ELEVATION CONTOUR
(DASHED WHERE INFERRED)




APPROX. LIMITS OF DRAINAGE SWALE




RAILROAD



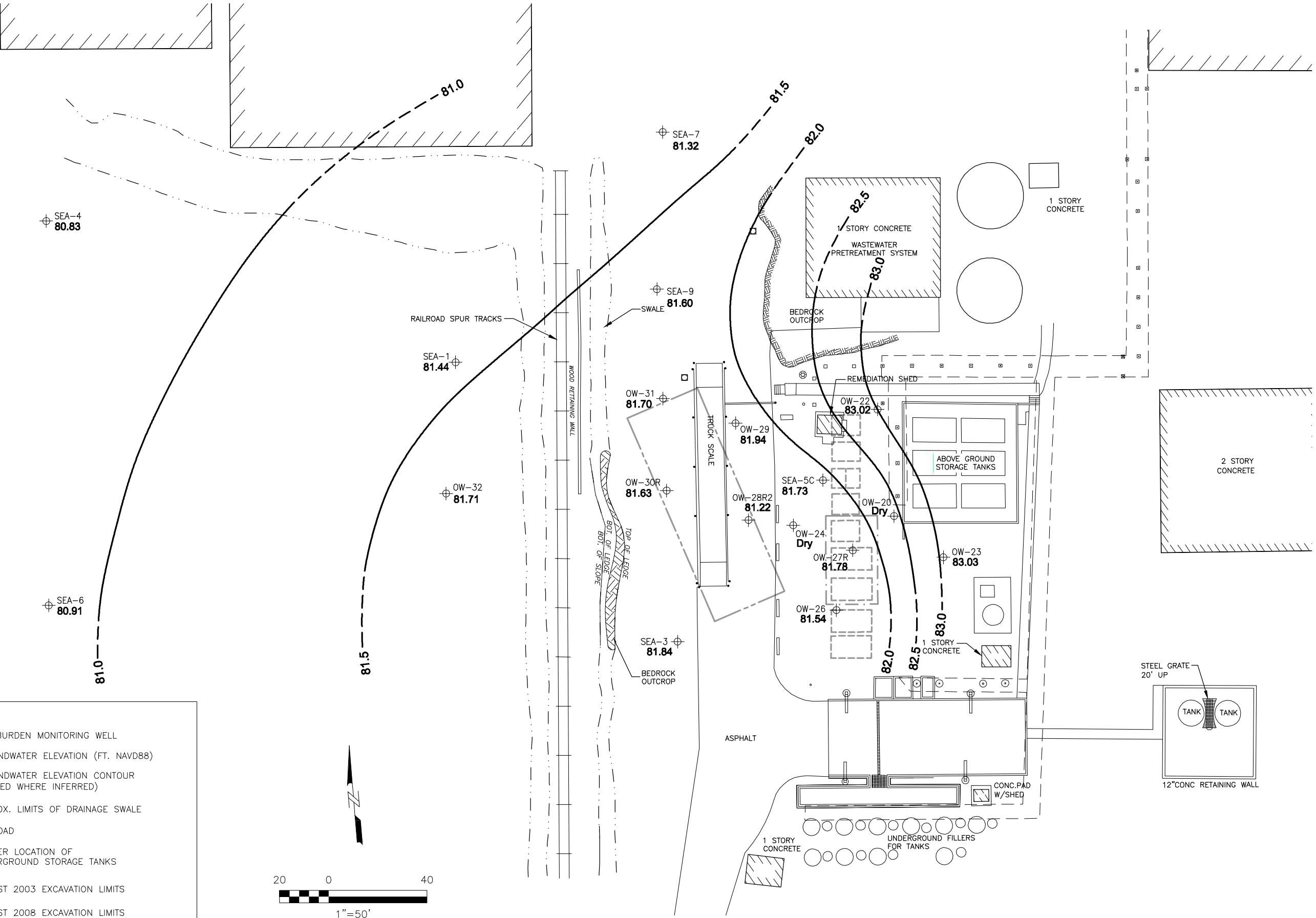
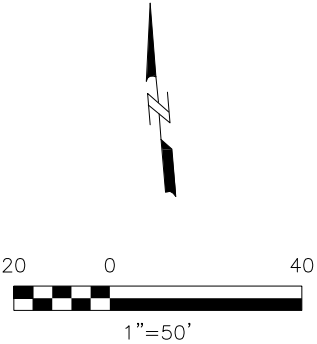
FORMER LOCATION OF
UNDERGROUND STORAGE TANKS



AUGUST 2003 EXCAVATION LIMITS



AUGUST 2008 EXCAVATION LIMITS




AECOM

DSM NeoResins+ FACILITY WILMINGTON, MASSACHUSETTS 60214160-400			OVERBURDEN GROUNDWATER ELEVATION CONTOURS - APRIL 2012	
DATE: 12/11/12	DRWN: RCW		FIGURE 5-3	

File: F:\PROJECTS\BeaTrice\NeoResins\60214160-P1-AN-01.dwg Layout: OB-GW-09-12 User: warrenr Plotted: Dec 11, 2012 - 2:24pm Xref's:


LEGEND




OVERBURDEN MONITORING WELL

80.91


GROUNDWATER ELEVATION (FT. NAVD88)




GROUNDWATER ELEVATION CONTOUR
(DASHED WHERE INFERRED)




APPROX. LIMITS OF DRAINAGE SWALE




RAILROAD



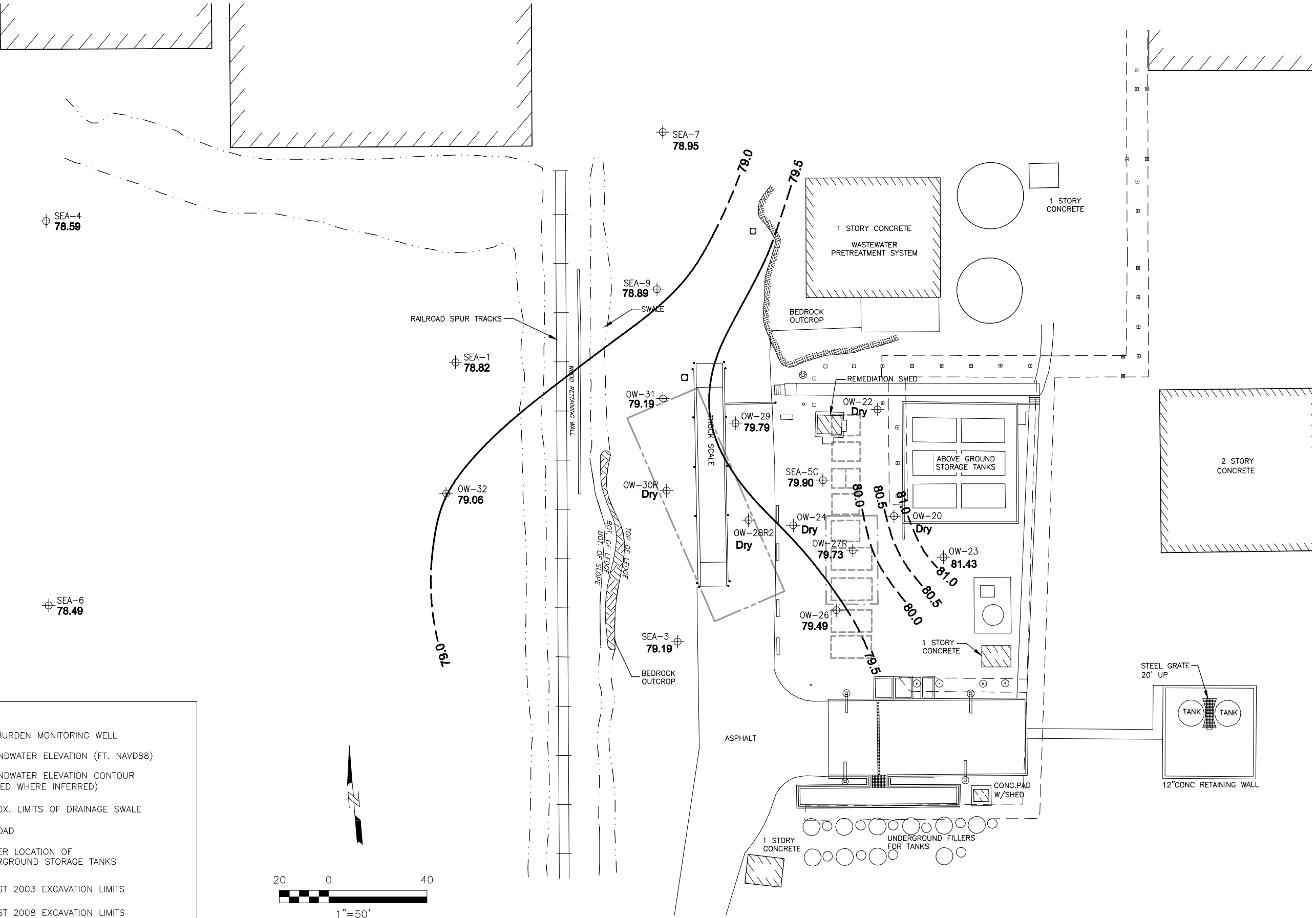
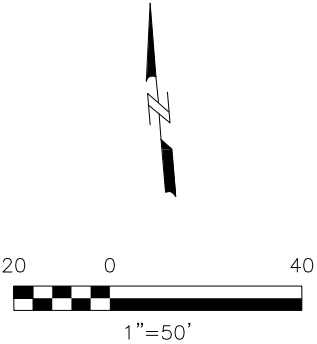
FORMER LOCATION OF
UNDERGROUND STORAGE TANKS



AUGUST 2003 EXCAVATION LIMITS

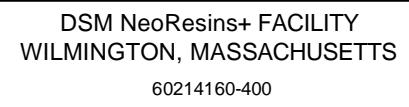
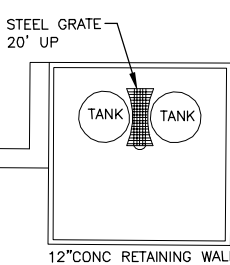
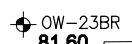
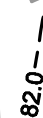
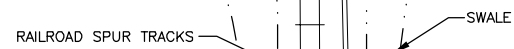
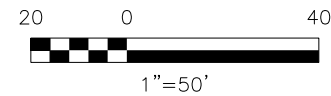


AUGUST 2008 EXCAVATION LIMITS




DSM NeoResins+ FACILITY WILMINGTON, MASSACHUSETTS 60214160-400			OVERBURDEN GROUNDWATER ELEVATION CONTOURS - SEPTEMBER 2012	
DATE: 12/11/12	DRWN: RCW		FIGURE 5-4	





File: F:\PROJECTS\Beatrice\NeoResins\60214160\Phase1\60214160-P1-AN-01.dwg Layout: BR-GW-09-12 User: warren Plotted: Dec 11, 2012 - 2:25pm Xref's:


LEGEND



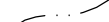
BEDROCK MONITORING WELL

80.91


GROUNDWATER ELEVATION (FT. NAVD88)




GROUNDWATER ELEVATION CONTOUR
(DASHED WHERE INFERRED)




APPROX. LIMITS OF DRAINAGE SWALE




RAILROAD



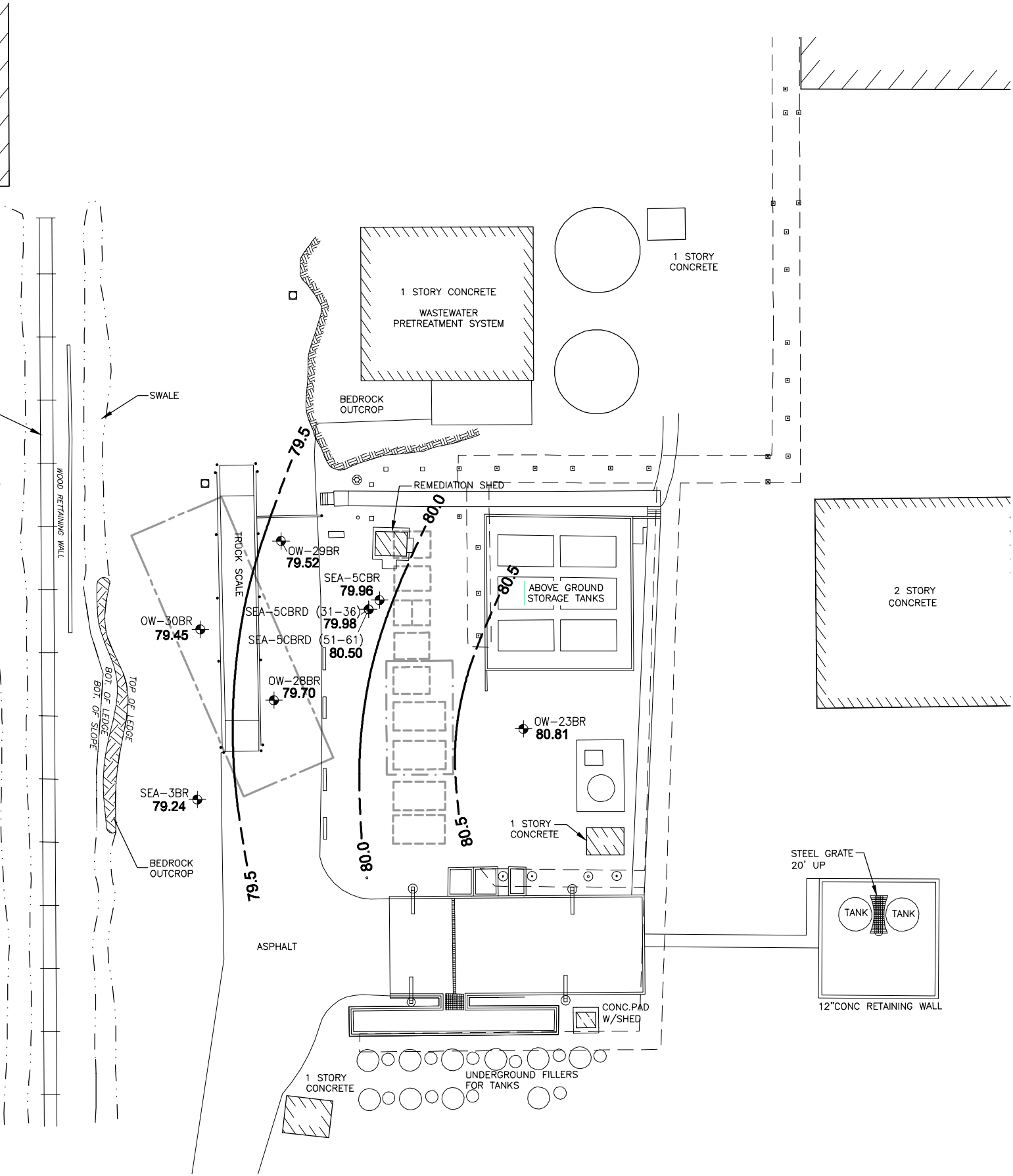
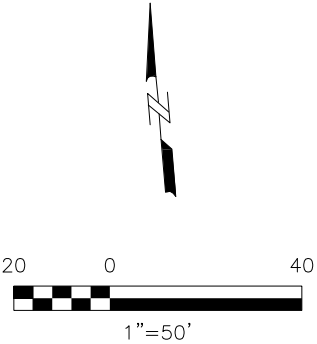
FORMER LOCATION OF
UNDERGROUND STORAGE TANKS



AUGUST 2003 EXCAVATION LIMITS



AUGUST 2008 EXCAVATION LIMITS



DSM NeoResins+ FACILITY
WILMINGTON, MASSACHUSETTS
60214160-400

BEDROCK GROUNDWATER
ELEVATION CONTOURS - SEPTEMBER 2012

DATE: 12/11/12

DRWN: RCW

FIGURE 5-6

